

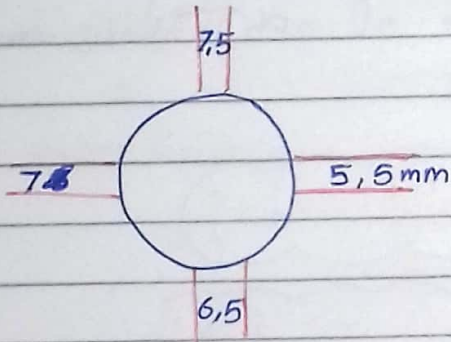
Extra ocular muscle

6 EOM → 4 Recti
 ↘ 2 obliques.

4 Recti :-

origin: Common tendinous Ring around optic foramen.
 at apex of orbit.

insertion: in Sclera in The front of equator
 at variable distance from limbus



MR : 5.5 mm

IR : 6.5 mm

LR : 7. mm

SR : 7.5 mm

2 oblique :-

origin :-

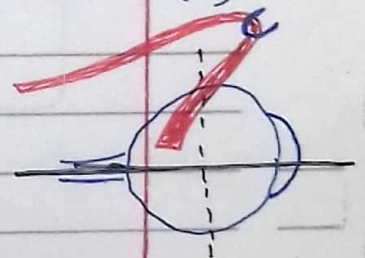
S.O → From Roof of orbital apex Superior and Medial
 To annulus of Zinn

I.O → From anterior Part of floor of orbit just
 lateral to opening of naso lacrimal duct
 (only muscle Has origin from front of eye)

insertion:-

S.O → behind equator in upper lateral
 Posterior quadrant of sclera.

I.O → behind equator in lower lateral
 Posterior quadrant of Sclera.



VISIT...

LANZAROTE
Caliente.COM

Nerve Supply :-

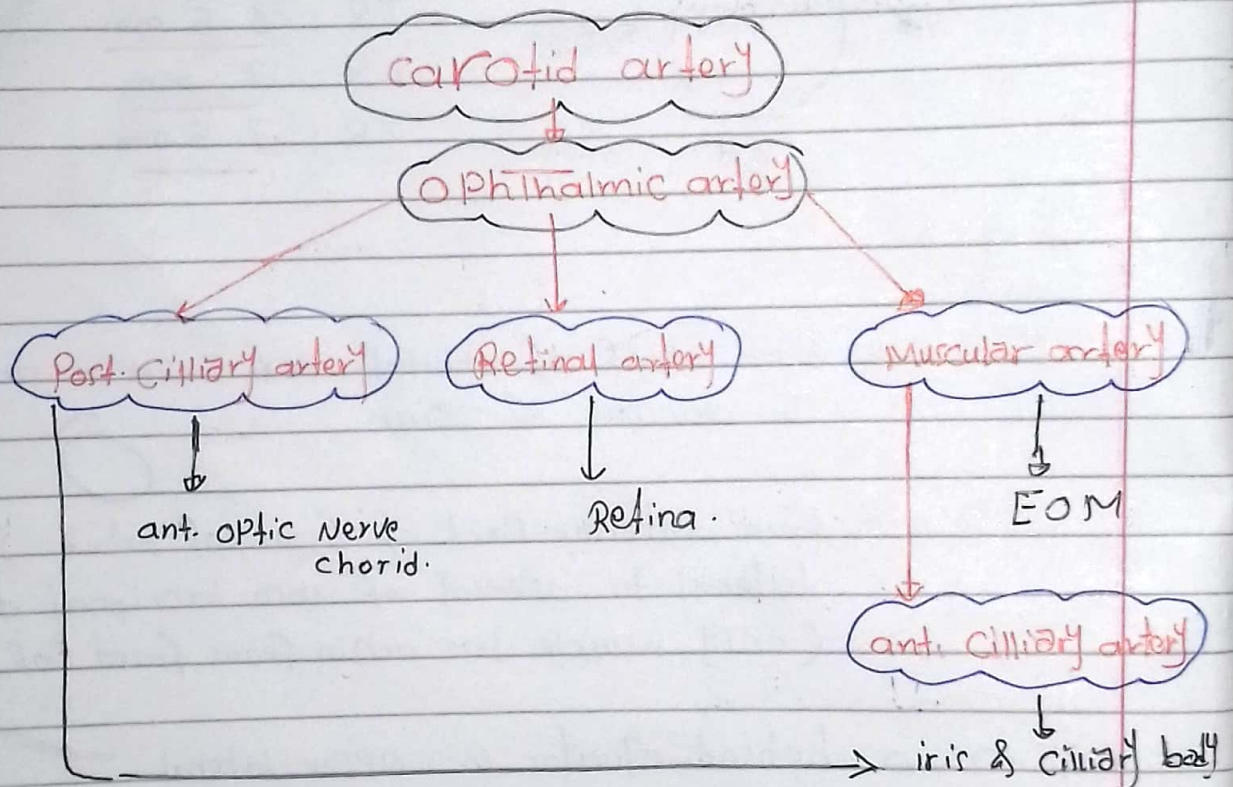
(S₄ & L₆ is occulo motor nerve)

3rd → SR & MR & IR & IO
 4th → SO
 6th → LR

N.B occulo motor → Sup. division (Sup. Rectus)
 → inf division (MR & IR & IO).

Blood Supply :-

Muscular branches of ophthalmic artery.

N.B

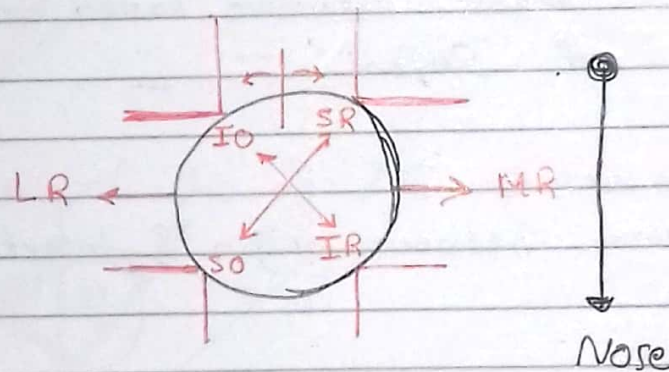
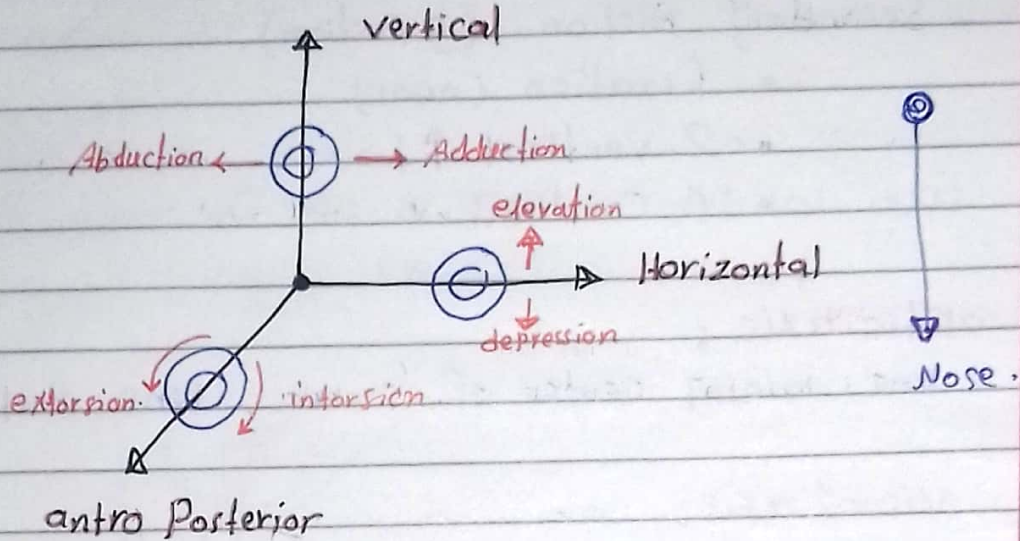
Action:

eye move around 3 axes.

Vertical → (adduction & abduction)

Horizontal → (elevation & depression)

Antro Posterior → (intorsion & extorsion)



Muscle	Primary action	secondary action I	secondary action II
MR	Adduction		
LR	Abduction.		
SR	Elevation.	Adduction.	intorsion.
IR	Depression.	Adduction.	extorsion.
SO	Depression	Abduction.	intorsion
IO	Elevation.	Abduction.	Extorsion.

Sup
↓
intort
inf
↓
extort

N.B

Primary Position

- when 2 eye are directed straight ahead. (muscle at rest)
- it maintain fixed with ahead erect or tilted to either side.

Secondary Position. (9 Position)

- Fixation (near)
- 2 vertical $\uparrow \downarrow$
- 6 Cardinal

optic axis :-

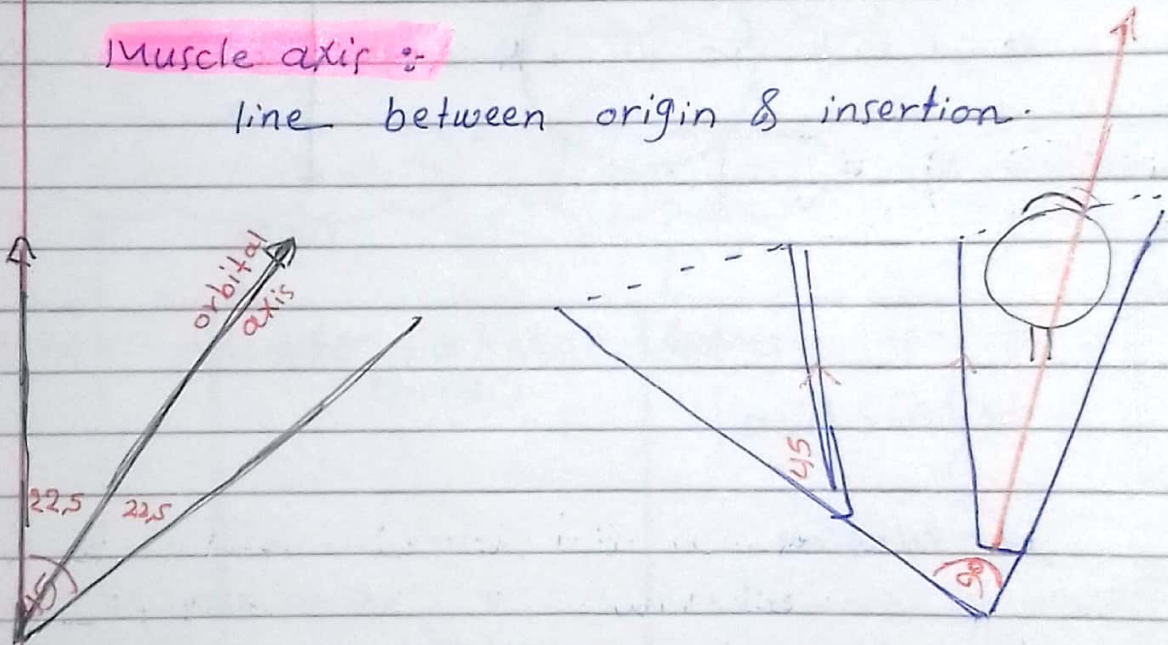
line joining center of cornea, lens, Post. Pole.

Visual axis :-

line connect between fovea and object of Regard.

Muscle axis :-

line between origin & insertion.



التي تحرك عند القراءة وتزول السهم الى S.O

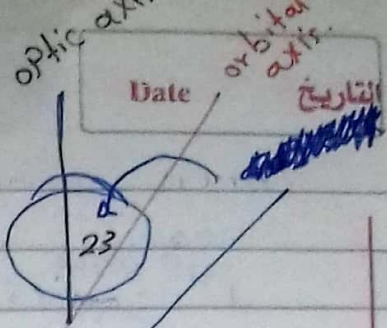
- Adduction.
- Depression.

Subject

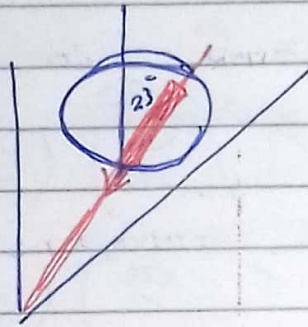
موضوع الدرس
orbital axis

Date

التاريخ



N.B axes of SR & IR = orbital axis.
(ماش مع ال orbital axis)



N.B axis of SO & IO $\Rightarrow$ optic axis مع ال optic axis
عامل زاوية له مع ال optic axis
axis of SO & IO

العضلات تشغل Main action فقط لو ال orbital axis كان مع ال optic axis
عشان كذا ال IR , SR يعملوا Main action للعين بتبقى Abducted
وال SO & IO يعملوا Main action للعين بتبقى Adducted

العضلات Main action مش هيحصل لو ال optic axis عمودي على ال Muscle axis.

ocular movement

Unocular

Duction

تحريك واحدة من العينين
إلى اتجاهات مختلفة

Duction:

- Mono ocular eye movement
- ✓ Adduction & abduction.
- ✓ Supraduction & infraduction.
- ✓ Intorsion & extorsion.

Version:

- binocular simultaneous conjugate movement in same direction by contraction of yoke muscle.
- (symmetric & synchronous movement in same direction)
- ✓ Dextro version & levo version.
- ✓ Supra version & infra version.

Vergence:

- binocular simultaneous disconjugate movement in opposite direction
- ✓ Convergence for near
- ✓ Divergence for far

binocular

Conjugate

Version

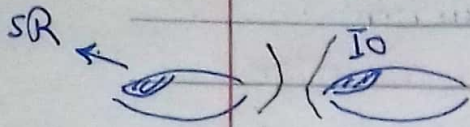
العينين يتحركان معاً
في نفس الاتجاه

Disconjugate

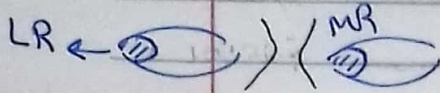
Vergence

العينين لا تتحركان معاً
عكس بعض

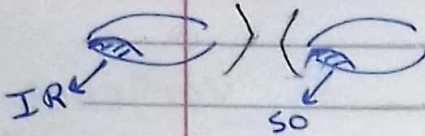
Yoke Muscle: Paired muscle move 2 eye
To certain direction. (same direction).



SR & IO → yoke muscle.



LR & MR → yoke muscle.



IR & SO → yoke muscle.

ال 6th & 3rd) 2 different nerve شفاطين Lt. MR & Rt. LR

إلى التي ربطهم ببعض

ال Medial longitudinal bundle. ودى بتوصل بين
3rd & 4th & 6th & 8th in both side.

ودى بتألف innervation من

✓ vestibular nucleus

✓ Hearing center

✓ visual center.

عشان كذا العين بتتحرك مع ال equilibrium & visual & hearing

Agonist :- Primary muscle which move eye in same direction.
Synergist :- muscle which help agonist in its action.
Antagonist :- muscle that act in opposite direction.

example LR — o Agonist ← SR
 Abductor — o synergist ← Elevator
 MR — o Antagonist ← S.O

Sherrington's law :-

Increased innervation of a muscle is associated with decreased innervation of antagonist in same eye.

N.B

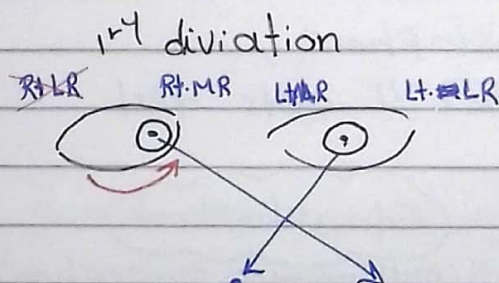
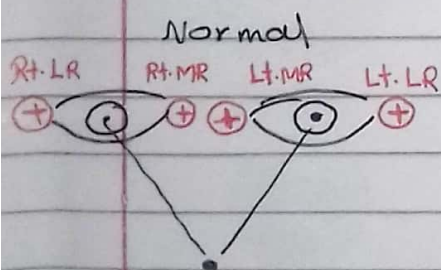
Agonist — o Rt. LR
 Contra lateral synergist — o Lt. MR
 Contra lateral antagonist — o Lt. LR

importance (1) physiology (2) Pathology.

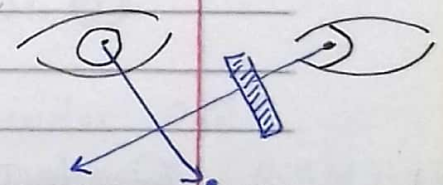
Herring law :- (1) physiology.

equal and simultaneous innervation of yoke muscle in both eye.

(2) Pathology.



2nd deviation.



Due to Paralysis of muscle eye move towards Antagonist of Paralytic muscle.

لو طبقت cover على العين اليمنى ومن حوصل تأثير لاذن العين الشال Fixating لو طبقت على العين اليسرى العين اليمنى فيها Paralysis كما دل

يجب ان يكون هناك Fixation فالغيبه لها اشارات اكثر وبالمثل هي غيبه اشارات اكثر
 L MR فالارشارات من العين Paralytic من كذا العين اليه فالعين اليسرى غيبه فيها deviation

Single binocular vision

def ability of brain to Perceive a single Mental image
 (see one image using 2 eye)

importance

- (1) large field of vision.
- (2) Stereopsis. (3D)
- (3) Masking defect of other eye.

development

it is acquired function of brain.
 it start develop at 6th month
 and become fully developed at 6th years.

Development Need 3 factor

- (1) Clear vision in both eye.
- (2) Coordination of both eye for all direction of gaze
 (Normal Retinal correspondence)
- (3) ability of visual area in brain to Promote fusion
 between 2 image.

Grade

- (1) Simultaneous Perception. الصورة من العينتين توصل اليها في نفس الوقت.
- (2) Fusion. اللسان توصل في نفس العينتين الشئان.
- (3) Stereopsis.

Testing

- (1) Synaptophore.
- (2) Worth's 4 dots test

Synaptophore

Grade I (Simultaneous perception).

Tested by Presenting 2 dissimilar images

Such as bird and cage

The Patient is asked to put The bird in
 The cage by moving tube.

Grade II (Fusion).

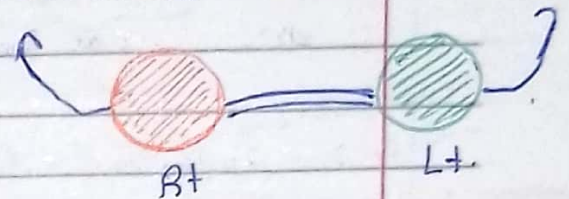
Tested by Presenting 2 Similar image with a missing detail in each.

(2 Similar Rabbits one lacking a tail and the other lacking bunch of flower).

Grade III (stereopsis).

Tested by Presenting 2 image of same object but with different angle. (bucket).

Worth's 4 dot test



aim.

Assessment of binocular vision.

Method

Patient wears Red/green glasses and looks to 4 dots (2 green & one Red & one white)

Result



4 dots with no squint
→ Normal binocular fusion.



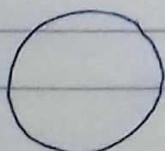
2 Red dots → eye under green is suppressed. (left).



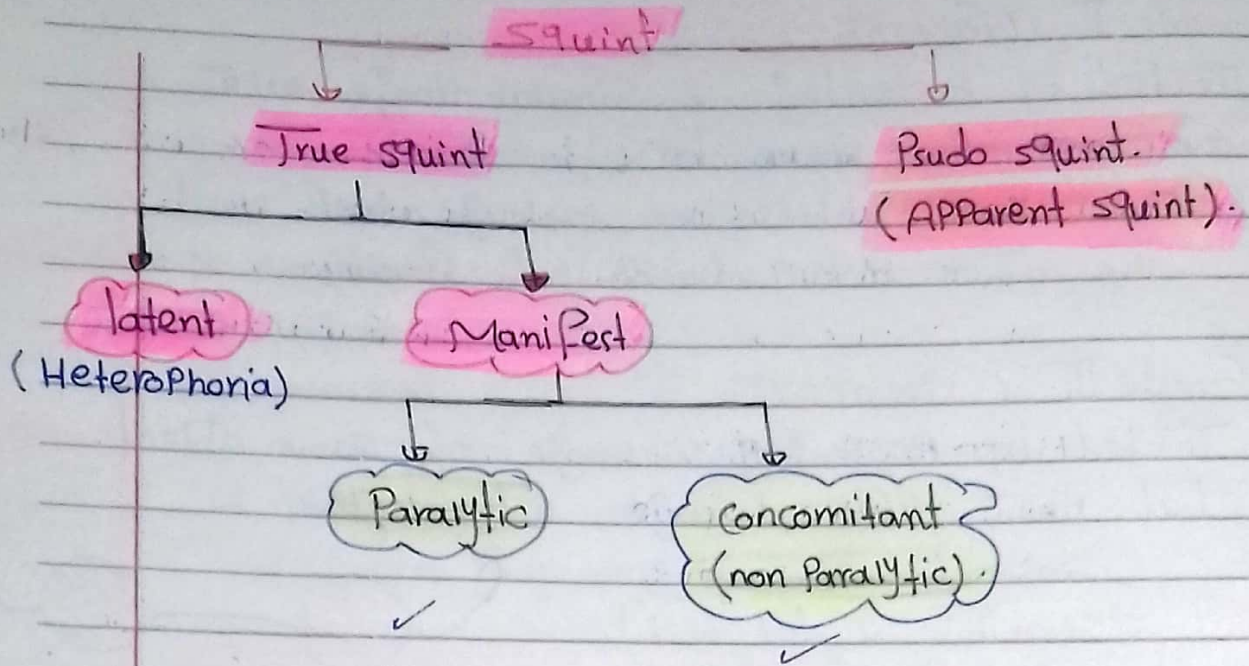
3 green dots → eye under Red is suppressed (Right).



5 dots (3 green & 2 Red) → diplopia.



4 dots with squint. →
Abnormal Retinal corresponding.



- Squint:**
- Abnormal Visual axis.
 - Condition in which visual axis of both eyes are not directed to same object.

N.B

Visual axis: line connect between Macula and object of Regard.

Angle α : it is angle between visual axis and optic axis.

latent squint (Heterophoria)

def.

Tendency for visual axis to deviate from orthophoric position when the BNV is dissociated as covering one eye.
(in interest of BNV brain الـ)

N.B Orthophoric (normal direction of Parallelism).

etiology

PF5

- (1) General Fatigue.
- (2) Mental Fatigue.
- (3) ocular fatigue.

①

Precipitating Factor

②

Anatomy

Physiology

wid. inter Pup -
Narrow inter

A/C Ratio Hyper-
Myope.

a Anatomy (i

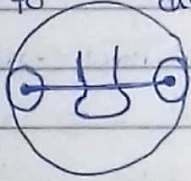
الـ brain الـ

* wide inter Pupillary distance

* Narrow inter Pupillary distance.

Tendency to deviation outward

Tendency to deviation inward.



b Physiology.

in hypermetropia:

The Patient use excessive accommodation to see clearly → Result in excessive Convergence → Result in latent convergent Squint.

in Myopia:

Patient Relax accommodation → Result in lack of Convergence → Result in latent divergent Squint.

Types

- (1) Exo Phoria eye tend to deviate outward.
- (2) Eso Phoria " " " " " inward.
- (3) hyper Phoria " " " " " up ward
- (4) hypo phoria " " " " " down ward.
- (5) in cyclo Phoria " " " " " Rotate in
- (6) ex cyclo Phoria " " " " " out.

Symptoms

✳ No Symptoms in compensated Phoria. (most cases).
In De compensated Phoria.

- (1) Muscular asthenopia. (Pain in eye) (P.L.B)
- (2) Runing of letters during Reading.
- (3) Posture Sensation defect. (نزول الخط، إلخ)

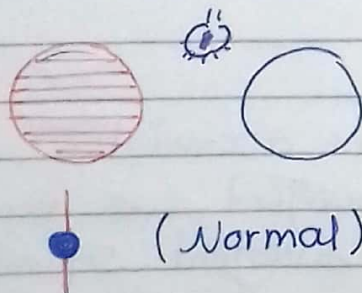
Diagnosis (sign).

1] Cover - uncover test

- ask patient to fix an object
- Cover then uncover one eye.
- If this eye deviate under the cover and correct its position with uncovering → latent squint.

2] Maddox Rod For far

- at 6 meter
- by using Red cylindrical lenses in front of one eye
- Patient fixate his eye in source of light



(Normal)

Exo Phoria

Eso Phoria

الشخص يشوف اللبة بالعين
اليمين فقط الأحمر ويشوف اللبة
بالعين اليسرى مال لمعادلة
الخط الأحمر واللبة العادية
يمكنه يصل بينهم Fusion وبالتالي
كأننا ألغيت ال BNU وبالتالي
ال brain من هيفك العينين
ال Normal يشوف الخط الأحمر من اللبة
Hetro Phoria يشوف الخط عيه أو مكان



③ Maddox wing for near

- at 1/3 of meter
- The Patient looks Through eye pieces of Maddox wing.
- Rt. eye See 2 arrows (vertical & Horizontal).
- Lt. eye see 2 scales (~ & ~).
- orthophoric See arrow Points to Zero
- in Heterophoria. The Patient Read his angle of squint

⊠ Compensated case → No symptoms — ⊠ No ⊠

⊠ in De compensated case.

(1) Correct any error of Refraction.

(2) Strengthen The weak muscle by.

- orthoptic exercise
- Exercises Prism (base towards deviation) esp. Horizontal Phoria
- Surgery if above Measure Failed.

(3) Relieving prism (base against deviation).

esp. in Vertical Phoria.

⊠ (4) Medical ⊠ For treat General & Mental, ocular fatigue (vit.)

(5) surgical if above Measure Failed.

- | | |
|------------|-----------------------------|
| ① optical | → correct error of |
| ② Medical | → Medical ⊠ Fatigue - |
| ③ surgical | → Prism → Exercises Prism - |
| | → Relieving Prism. |

Concomitant Squint (non Paralytic)

def: - It is a manifest squint in which the angle of squint is constant in all direction of Gaze
i.e. Move together freely with no limitation of Movement
(Non Paralytic)

etiology: - [1] lesion in afferent pathway - defect Vision in one eye

- Central Corneal scar عيب بؤبؤ العين
- Complet Ptosis object of Regard
- Congenital cataract. عيب في العين من الولادة
- Prolonged covering. العين مغطاة العين مع وضع
- Retinal Pathology. كدمات العين بؤبؤ العين object
- lesion optic N. والعيون الثانية بؤبؤ العين من الولادة

[2] uncorrected error of Refraction. A/C Ratio

* in hypermetropia - Convergent Squint
due to More accommodation to see clearly is associated with more Convergence.

* in Myopia - Divergent Squint
due to Relaxation of accommodation is associated with lack of Convergence.

[3] defect in Fusion center.

[4] Combination.

accommodation
Convergent
والقوة
Hyper Metropia
تحتاجون قوة
Accommodation
لرؤية بوضوح
في البعد
Accommodation
10 درجات
Conversion
بالتالي
العدسة

Types: (A) According to which eye deviate.

(1) unilateral :- one eye is always deviating while other eye is always fixing.

(2) Alternating :- The 2 eyes alternate deviation and fixation.

(B) According to direction of ~~fixation~~ deviation :-

(1) Esotropia

(2) Exotropia

(3) Hyper tropia

(4) hypo tropia.

Tropia = deviation.

Sequelae of Concomitant squint?

to avoid diplopia. Produce by stimulating Non Corresponding Point on the Retina The brain of child will lead to :-

1] Suppression.

It is active and Temporary neglects the image of squinting eye by brain while fixing with non squinting eye.

2] Amblyopia ex-anopsia.

- decrease in V.A in squinting eye due to Prolonged suppression.
- it occurs in unilateral squint.

3] Pseudo Macula.

Eccentric Fixation. Patient able to use Para foveal area for fixation.

4] Eccentric fixation.

(عينية محاولة دعى بالرغم منه ذلك بالعين قدادة) ودة بؤدى الى

1) Test ocular Motility to exclude Paralytic squint.

Subject

موضوع الدرس

Date

التاريخ

لدا الحول متعاقف يقدر يركز بالعين بالسهولة من الحول

Diagnosis: 1) **Cover - uncover test** لدا الحول من ناحية واحدة مبدئياً يركز بالعين
بالسهولة
→ Diagnose Type of squint after cover Removal.
(a) **Alternating** → if Remain fixing with squinting eye after cover Removal

(b) **unilateral** → if original Position Return after cover Removal

2) Visual acuity

- if equal in both eye → alternating squint
- if unequal → unilateral squint

لو فرق
بين
العينين
Alternating
لو الفرق
في
طول
العين
unilateral

3) Corneal light Reflex.

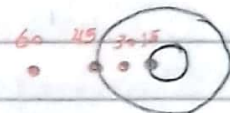
Normally light Reflex is centered in both pupils.

3) Measurement of Squint.

- **Corneal light Reflex:** (Corneal light Reflex)

Normally light Reflex is centered in both pupils.

- if LR falls on Pupillary edge = 15
- if R.R fall on limbus = 45.



- **synaptophore:**

The angle that make the 2 Test objects Superimposed = angle of squint.

- **Prism bar - cover test:**

4) Assessment of binocular vision (test for amblyopia)

- **Synaptophore.**

- **Worth's 4 dot test**

in Rt. Suppression → see 3 green dots

in Lt. ~ ~ ~ 2 Red dots

Ht:

Aim

- (1) to Restor binocular vision.
- (2) to improve & Preserve visual acuity of squinting eye
- (3) to improve cosmetic appearance.

Time

- early as possible before 6 years.
 - ✓ to avoid amblyopia.
 - ✓ to allow BNV to develop.
- Cases treated after 6 year are treated for cosmetic appearance.

line of Ht

Treatment of causes.

- Optical
- Medical (Drug)
- Orthoptic Exercises.
- Surgical Ht

a) organic causes. Ptosis Correction
Kerato Plasty
Cataract extraction.

b) correction of error of Refraction:-
by Glasses. (Full correction of error
Anisometropia → contact lens. by glasses).

c) Exercises.

- Home work (Convergence exercises in divergent Squint).
- by the use of Synaptophore.

d) Surgical

if angle still after all measure.

- weakening procedures → Recession (move its insertion backward)
- Strengthening procedures → Resection (shortening muscle)
- if Adult > 6 year
- if Non Refractive cause.
- big angle.

indication

Subject

موضوع الدرس

Date

التاريخ

2 - ~~III~~ of amblyopia.

by covering sound eye to improve
the vision of amblyopic eye.

N.B Value of cover test

(1) diagnosis of apparent squint.

(2) ~ ~ latent ~

(3) ~ ~ paralytic ~

(4) differentiation between unilateral, alternating squint

≡

- ✓ 1 Treatment organic causes.
- correction of Ptosis
 - Keratoplasty
 - cataract extraction.

- ✓ 2 Correct error of Refraction.
(Full correction by glasses)
Anisometropia → CL

- ✓ 3 Exercise
- by → Homework exercise.
 - or → Synaptophore.

- ✓ 4 Surgical
- Weakening Procedures → Recession
 - strengthening Procedures → Resection.

+

≡ Amblyopia

عسر البصر

Paralytic squint

def. It is manifest squint due to paralysis of one or more of E.O.M.

Etiology

A Congenital

- congenital absence of nucleus
- Congenital maldevelopment of muscle.

B Traumatic.

- Fracture base of skull
- fracture bony orbit

C inflammatory.

- Meningitis
- Encephalitis
- Neuritis

D Neoplastic.

- Tumor of brain stem
- Brain tumor
- orbital tumor

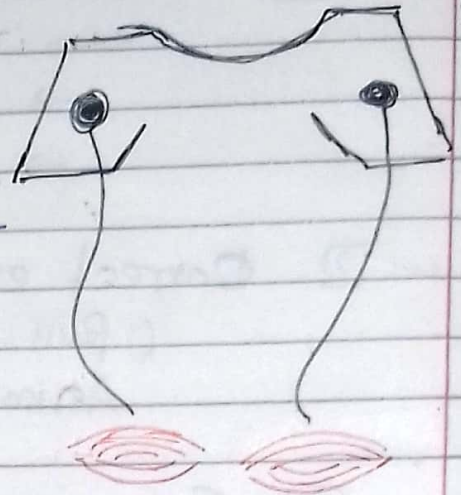
E Miscellaneous.

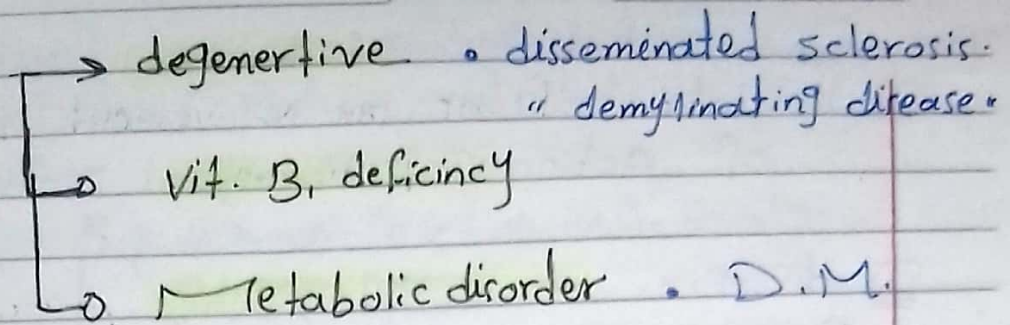
Vascular

- Spasm
- Thrombosis
- HMG
- Embolism
- Aneurysm

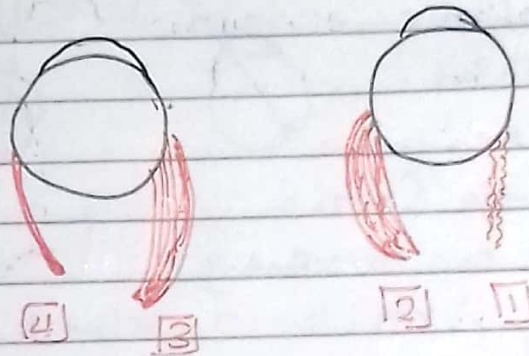
Toxicity

- exogenous toxin "Pb" (lead)
- Endogenous toxin "diphtheria toxin"



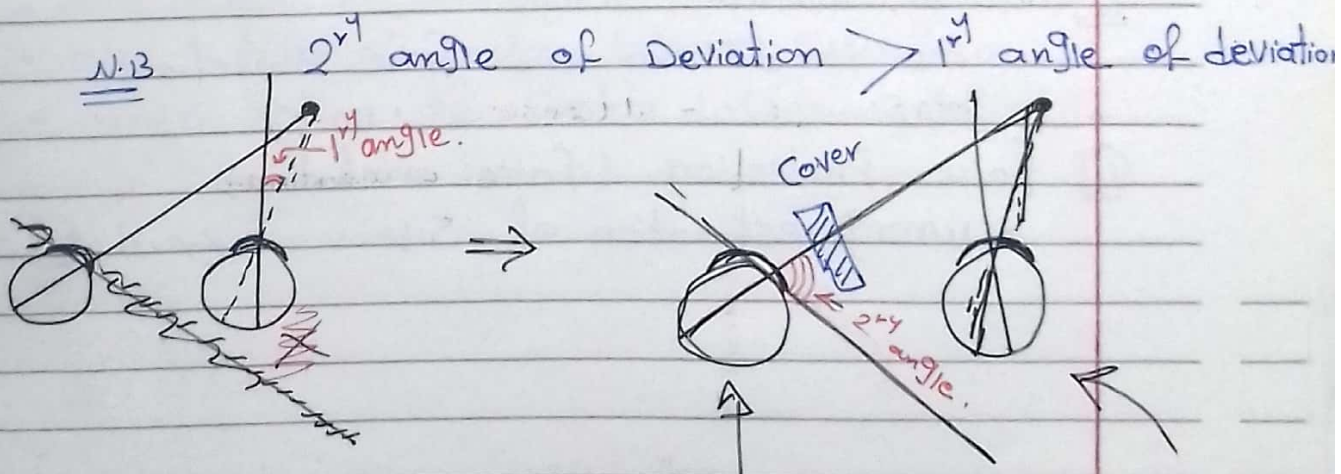


Pathology :



lesion in [1] → over action [2]
over action [3] → inhibition [4]

* lesion in Muscle → over action in Direct Antagonist
→ over action in contra lateral Synergism.
inhibition in Contra lateral Antagonism.



هيجي لى
! شارة زيادة مس. ب.

دى متكامل قبل
نفسه ان تشوف

Clinical Picture

84 symptoms → in direction of action of Paralyzed muscle.

① limitation of ocular Movement in direction of Action of Paralyzed Muscle.

• 2nd angle of deviation > 1st angle of deviation

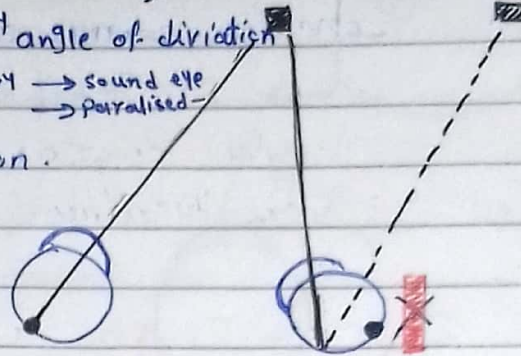
Secondary → sound eye
Primary → paralysed

② diplopia.

• Simultaneous Perception.

of 2 image for same object

binocular

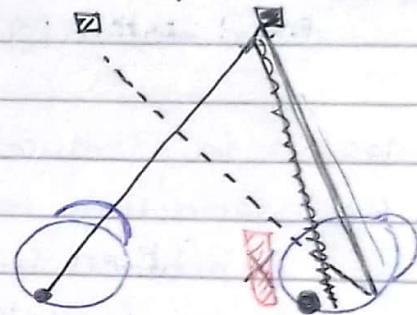


⇒ cause :- image falls on non corresponding Points.

un crossed diplopia

✓ it occur in Paralysis of Abductor muscle.

⇒ Types ① uncrossed
② crossed.



crossed diplopia

✓ it occur in Adductor Paralysis

③ nausea, Vomiting, vertigo due to diplopia and false Projection.

④ false Projection. (false orientation).

• wrong estimation of Site

5] Ocular torticollis. (compensatory Posture).

- Abnormal head Posture adapted by the Patient. To minimize diplopia.
- it occurs in same direction of paralyzed muscle.

- ✓ in horizontal deviation → Face Turn.
- ✓ in vertical deviation →
 - Face Turn.
 - Head tilt
 - chin depression or elevation.

Diagnosis:

- 1] Testing ocular Motility.
- 2] Diplopia chart
- 3] Hess Screen



Complication

- 1] in young Patient, Suppression May occur to avoid diplopia which lead to amblyopia.

لو شوقت diplopia
فالمربع يبقى
Rt. LR & Lt. MR.
Rt. LR ← uncrossed
Lt. MR ← crossed

2] Muscle changes

- over action in ^{Direct} Antagonist.
- over action of contra lateral Synergism.
- under action of Contra lateral Antagonist.

treatment

1] Treatment the cause.

(aneurysm, Neoplasm, inflammation)

2] To avoid diplopia.

- Alternate occlusion.
- or
- Reliving Prism. (apex towards deviation)

3] Surgical treatment.

After 6 month if no Recovery.

- ▶ Weak muscle → Strengthen by Resection.
- ▶ Strong muscle → weaken by Recession.
- ▶ Complete Palsy → Trans Position of Healthy Non Paralyzed Muscle.

4] botox. used to avoid contracture of muscle.

Apparent squint "Pseudo-squint"

def. Condition in which The Person appear having squint Although the 2 Visual axis are directed to same object. (Abnormal angle α with normal visual axis).

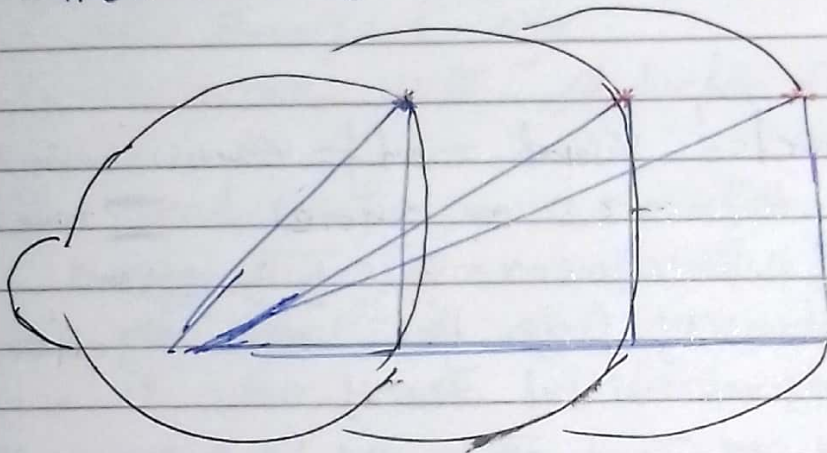
Etiology

Apparent Convergent

- 1- Epicanthus
- 2- Blepharophimosis
- 3- Small inter pupillary distance.
- 4- High axial Myopia

Apparent divergent squint.

- 1- lateral ankylo blepharon
- 2-
- 3- wide inter pupillary distance.
- 4- High axial hypermetropia.



N.B

apparent diversion squint ← Angle α كبير
apparent conversion squint. ← Angle α صغير

* في العين البعيدة (hypermetropia) angle كبير
* في العين القريبة (myopic) angle صغير

Sign.

1. Presence of cause.
2. Cover test → No Movement.
3. Corneal light Reflex → may be normally centered.

It

Treatment of cause.

Amblyopia.

def.

(vision loss without obvious organic cause)
impaired vision in absence of organic disease.
it Result from lack of continuous use of one or both Fovea.

type

- ① Stimulus or Pattern amblyopia.
- ② Refractive amblyopia
- ③ Nutritional & toxic amblyopia.
- ④ Hysterical amblyopia.
- ⑤ idiopathic amblyopia.

character

(Sign).

- ① Poor corrected visual acuity. لا يستطيع البصيرة بالحدس
- ② 2 line difference or more. — 2 line.
- ③ Crowding Phenomena. E S L A E S L A
- ④ Natural density filter test → No significant drop in visual acuity.
- ⑤ Visual acuity less than other eye by 2 line or more

occlusion or Patching therapy.

* it is important to diagnose amblyopia early as possible (before 9 years).

* occlusion therapy either

→ full time or Part time 6 h/day.

depend on . age of patient . density of amblyopia

* occlusion done

→ To ~~so~~ better eye ~~the eye~~ but
After treating the cause and
before Age of 9 year.

فلتر الكثافة الطبيعي يقل البصيرة
لكنه لا يقل البصيرة للعين الا
amblyopia من قبل كثير

HL

Diplopia

def. Simultaneous Perception of 2 image for same object

Causes image fall in non corresponding point on Retina.

Character

- ① binocular (disappear if one eye covered).
- ② Move in direction of action of paralyzed muscle.

Type

- ① uncrossed (Homonymous) diplopia :
 - when the false image falls on the same side of paralyzed eye.
 - it occurs with Abductor Paralysis.

- ② crossed (Heteronymous) diplopia.
 - when the false image falls on opposite side of paralyzed eye.
 - it occurs with Adductor Paralysis.

Patient fight diplopia by ?

- ① suppression in children.
- ② covering one eye in ~~the~~ binocular diplopia.
- ③ C.H.P. "Compensatory Posture"

Diagnosis

- (1) Diplopia chart
- (2) Hess screen.

N.B binocular diplopia - Patient see two image for same object.

(Type of diplopia)

binocular diplopia

- ① Anisometropia.
- ② Paralytic squint
- ③ Restrictive Motility as
(sympblepharon, Tumor, Pterygium)
- ④ Myasthenia gravis
- ⑤ Thyroid eye disease.

unioocular diplopia

- ① Incipient cataract
- ② Iridodiolysis
~~subluxation of lens~~
- ③ Irregular Astigmatism.
- ④ Subluxation of lens

3rd Nerve Palsy

- (1) **P**tosis due to Paralysis of levator
- (2) **P**aralysis of EOM → deviation out
- (3) **P**aralysis of Accommodation d2 Paralysis of ciliary M.
- (4) **P**roptosis (Mild) d2 loss of tone of Paralyzed M.
- (5) **P**upil → dilation d2 Paralysis of Constrictor M.
- (6) No diplopia d2 Pto's.

3rd Nerve Palsy c.c.c by

- ① **D**ivergent squint
- ② **D**rooping of upper lid.
- ③ **D**ilated fixed Pupil.
- ④ **D**iplopia appear only if Partial Pto's or lid is elevated.

6th Nerve Palsy ✓✓

sign of Paralytic squint

- ① Convergent squint
- ② Diplopia (uncrossed).
- ③ Face Turn towards Paralyzed Musck.
- ④ False Projection
- ⑤ Nausea, Vomiting, Vertigo.

Aqueous Humor

def.

Transparent fluid fills ant. & Post. chamber.

Function

① Maintaining intra ocular Pressure. which important
For • Keeping shape of eye.
• Regulation of perfusion through capillaries.

② one of Refractive media of eye. 1.33

③ nutrition and drainage waste product of
avascular lens and cornea (lymph of eye).

④ Contain high level of anti oxidant.

⑤ bring more anti bodies if eye inflamed
→ Plasmoid aqueous.

N.B

الـ aqueous هو نفس مكونات الـ Plasma لكن بتركيز أقل
aqueous barrier. low Protein. Na^+ Cl^-

Secretion

From ciliary Process by:

① Active secretion. 70 %

Carbonic Anhydrase is needed.

② Ultra Filtration 20 %

Through pressure gradient.

③ diffusion 10 %

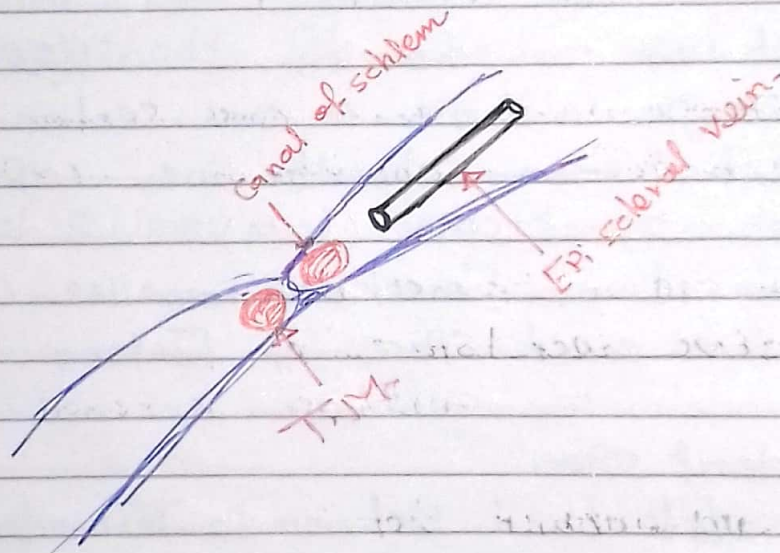
Through osmotic gradient.

Circulation :- From ciliary Process $\rightarrow$ P.C. $\rightarrow$ A.C
Through Pupil $\rightarrow$ drainage Through angle.

Drainage: ① Angle of 80 %
Through canal of schlemm $\rightarrow$ Trabecular Meshwork $\rightarrow$ episcleral vein.

② Uveo scleral Pathway . 15 %
• Space between sclera and uveal tract
• Passes to Supra ciliary and supra choroidal to Vortex vein.

③ Iris crypt.
little amount passes Through iris crypts and absorbed Through iris stroma.



angle of Ant. chamber.

def. it is an area corresponding to limbus externally

Structure

- (1) Schwalbe line.
- (2) Trabecular Meshwork
- (3) Scleral spur
- (4) Ciliary body.
- (5) Root of iris.
- (6) Canal of schlem.

→ Schwalbe line.

- Post. Termination of Descemet's Membran and ant. Termination of T.M.

→ Trabecular Meshwork :- للشبكات

- Triangle in shape in cross section.
- extend from Schwalbe line (apex) to Scleral spur (base).
- Formed of Fenestrated lamellae contain ~~space~~ Pores called Space of Fontana.

→ scleral spur.

- white band Posterior to Trabeculum.
- Gives attachment to longitudinal ciliary muscle.

→ Ciliary body.

- Part of base.

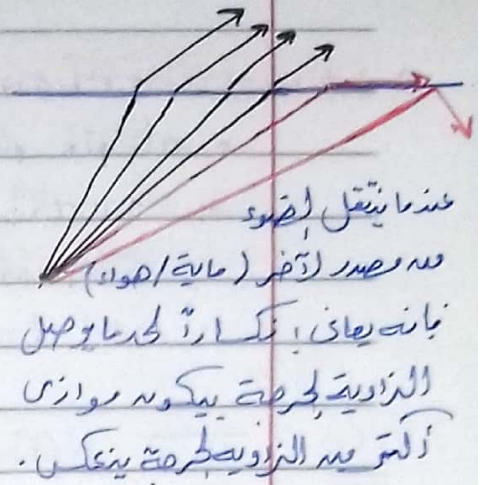
→ Root of iris.

→ Canal of schlem.

- Circular canal at corneo scleral junction.
- Not seen by gonio scopy.

angle examination [Gonioscopy]

- angle of Ant. chamber cannot examined except by Gonioscopy due to :
→ Total internal Reflection.



- To overcome this Phenomena. Gonios lens is used. as Goldman Three Mirror contact lens.

Structure visible by gonioscopy ?!

- (1) Schwalbe line (white line).
- (2) T.M (grayish brown).
- (3) scleral spur (white band).
- (4) Ciliary body.

N.B Cornea of schlemms not seen by Gonioscopy.

intra ocular Pressure.

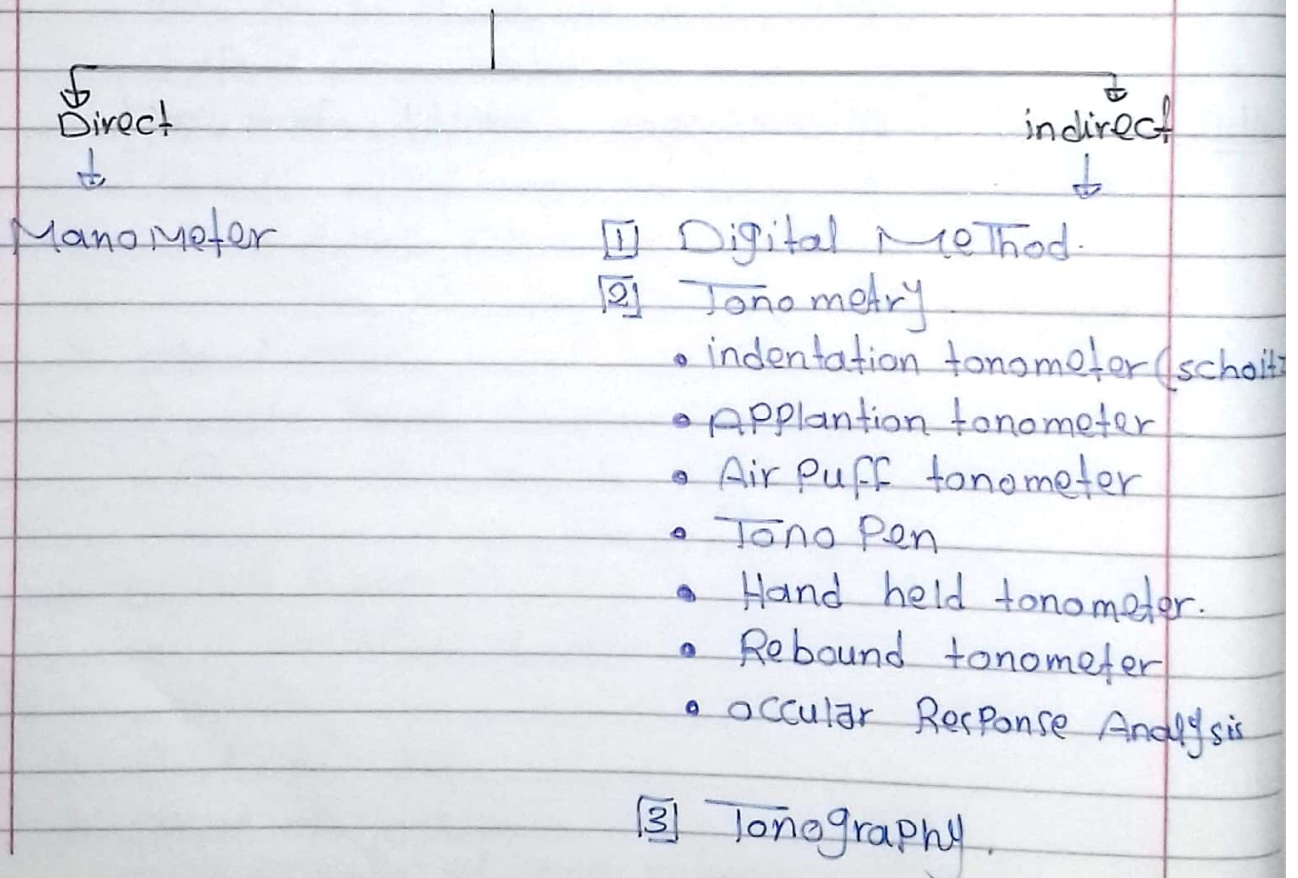
- **Normal Range.** 10 - 22 mmHg.
- **Diurnal Variation.**
 - about 4 mmHg
 - Normally I.O.P highest in Morning. due to Steroidal Circadian Rhythm "secretory function" and lowest in evening.

N.B The difference between 2. eye usually < 4 mmHg

Causes of $\uparrow$ I.O.P.

- ✓ $\uparrow$ secretion
- ✓ $\downarrow$ Drainage

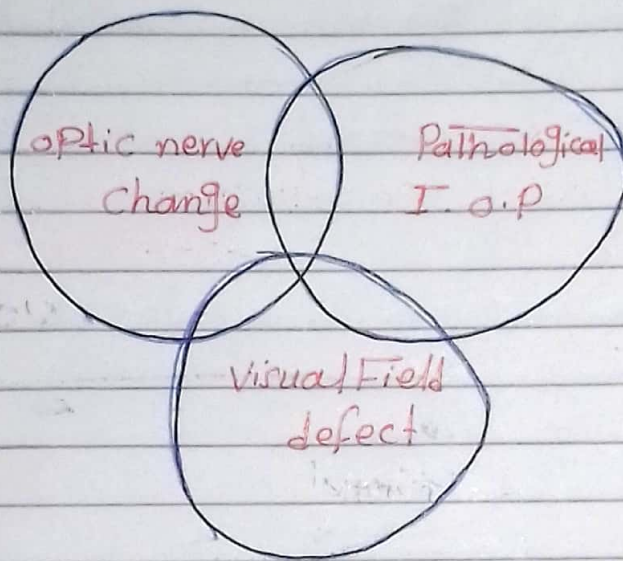
Measurement ?!



Glaucoma

- def:
- It is an optic neuropathy in which increase in I.o.p is only Risk Factor.
 - disease characterised by $\uparrow$ I.o.p above normal level sufficiently to damage optic nerve

N.B



- High I.o.p + Optic nerve damage + Field defect $\rightarrow$ Glaucoma
- High I.o.p + Normal optic nerve + Normal field $\rightarrow$ ocular hypertension
- Normal I.o.p + Optic nerve damage + Field defect $\rightarrow$ low tension Glaucoma

Theories of optic nerve Fiber damage in Glaucoma:-

Mechanical

by direct Pressure
on optic nerve
Fiber.

Ischemic.

Pressure on B.V
supplying optic nerve
Fiber

neurocytotoxic

due to ganglion
cell apoptosis.
That Releases cytoki
That Kill nearby
healthy cell.

Classification of Glaucoma:

Congenital

Buphthalmous

acquired.

Primary

closed Angle

open
angle

Secondary.

closed
angle

open.
angle.

N.B

Primary → cause at angle.

Secondary → cause other angle.

Congenital Glaucoma

Primary Buphthalmos

def: elevation of I.O.P before 2-3 year due to Congenital angle anomaly.

etiology

- (1) Abnormal mesodermal membran in angle.
- (2) Anterior insertion of Ciliary muscle.
- (3) Absence of canal of schlem
- (4) Failure of sePrtion of iris from cornea.

incidence

- 80 % within First 6 month of life.
- 30 % bilateral.
- 80 % Male.
- 10 % autosomal Recessive inheritance.

Symptoms

" given by mother "

Early :- Blepharo Spasm
lacrimation.
Photo Phobia.

due to
irritation
of corneal
nerves by
Edema.

BLP

late :- Blue Sclera.
larg globe.
Poor vision (cloudy cornea)

PLP

Sign

1] External appearance

- Pseudo Proptosis.

2] Cornea.

- Diameter $\rightarrow$ increased upto 13-14 mm (N: 10-12).
- Curvature $\rightarrow$ decreased (More Flat and Thin).
- Transparence $\rightarrow$ decreased (Hazy cornea due to edema).
- Haab's stria $\rightarrow$ Horizontal stria due to Rupture of Descemet's Membran.

3] Sclera.

- Thin and blue. (uvea shine Through it).

4] Anterior chamber.

- deep.

5] iris.

- Tremulous.

6] Pupil.

- dilated & sluggish $\leftarrow$ تنقل ضعيف مع الضوء

7] lens.

- Flatten and displaced backward.

8] Zonule.

- Stretched.

9] Refraction.

- axial Myopia due to globe Enlargment but less Than expected due to
 - Flat cornea
 - Flat lens.
 - Post. displacement of lens

10] I.o.P.

- high I.o.P.

11] Gonioscopy.

- Show angle anomaly.

12] Fundus examination.

- Cupping of optic disc

Complication: [ELNAS + C] الناس مسبتش الولد في ماله 😊

- ① loss of vision due to optic atrophy.
- ② Ectopia lens (subluxation or dislocation).
- ③ Secondary cataract.
- ④ Corneal Scarring.
- ⑤ Amblyopia in unilateral cases
- ⑥ Nystagmus in bilateral cases.

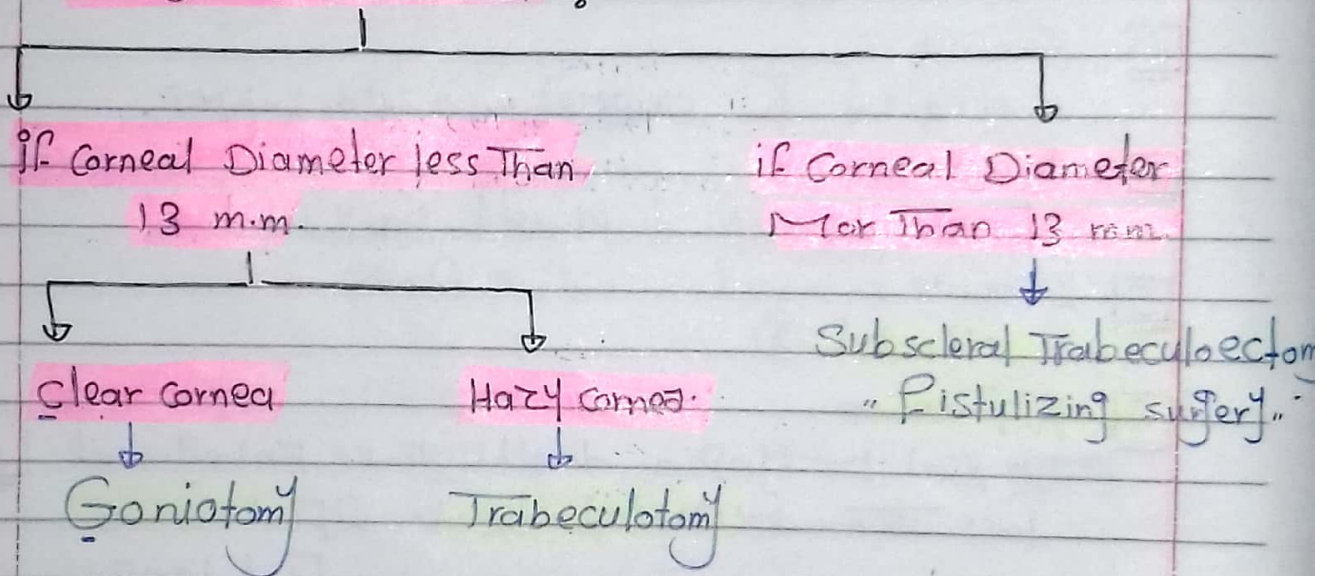
III

→ Treatment is Surgical.

→ Medical Treatment not effective used only.

- For
- Preparation for surgery.
 - Adjuvant after surgery.

Surgical Treatment :-



Goniotomy

gonio knife is used to do incision on T.M. under direct visualization. using surgical gonio lens (Barkan's lens).

Trabeculotomy

- using curved metal probe to do incision in canal of schlemm to allow passage of aqueous.

Subscleral Trabeculoectomy

- creating fistula between A.C and Sub conjunctival space allowing drainage of aqueous by conjunctiva and episcleral veins.
- It done
 - ✓ Alone
 - or with adjuvant use of Mitomycin.
 - or with Glaucoma drainage device.
 - "Ahmed valve"

↓
To decrease incidence of bleb formation which induced by fibrosis.

Diagnosis: (1) History

- (2) Horizontal diameter of Cornea.
- (3) Gonioscopy → show angle anomaly.
- (4) Ophthalmoscopy → show fundus.
- (5) Tonometry.

D.D

Blue sclera : "Shbso"

- (1) Congenital Myopia.
- (2) Staphyloma.
- (3) Osteogenesis imperfecta.
- (4) Buphthalmos.

Large Cornea:

- (1) Megalo cornea.
- (2) Kerato globus
- (3) Congenital Myopia.
- (4) Buphthalmos.

Lacrimation in neonate:

- (1) Ophthalmia neonatorum.
- (2) Congenital NLD obstruction.
- (3) Buphthalmos.

Cloudy Cornea at birth:

- (1) Intra uterine Keratitis.
- (2) Birth Trauma.
- (3) Corneal Endothelial dystrophy.
- (4) Buphthalmos.
- (5) Mucopolysaccharidosis.

D.D of Red eye

مميزات العين الحمراء

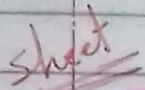
- ① Conjunctivitis
- ② Corneal ulcer
- ③ Acute iridocyclitis
- ④ Acute congestive glaucoma.

	Conjunctivitis	Corneal ulcer	Acute iridocyclitis	Acute Cong. Glaucoma
Discharge	+++++	(X)	(X)	(X)
A.C	Normal	Normal	Flare	shallow
I.O.P	Normal	Normal	May increase	+++++
Pain	(X)	Pain	Pain	Pain.
Vision	Normal	affected	affected	affected.
Fluorescein	-ve	+ve	-ve	-ve.
Flare	(X)	(X)	Flare	(X)

N.B

Secondary Buphthalmos: "acquired"

- (1) Tumor — o Retinoblastoma.
- (2) Trauma
- (3) inflammation — o neonatal uveitis.
- (4) Associated to ocular Anomaly —> Aniridia.
- (5) Associated to Systemic Anomalies.
 - Congenital Rubella.
 - Sturge - weber Syndrome (Hemangioma) ← brain
skin
eye.
- (6) After lens extraction (Aphakic glaucoma).
- (7) Retinopathy of Prematurity.



Acute Congestive Glaucoma

Def: Primary Glaucoma characterized by acute increase of I.O.P due to sudden closure of angle by peripheral iris.

رق عجز عصبية لادبست نضارة دهلست السينا وانفريت
عاز فيلج زعد

(1) Age (above 40 years) ?!
due to increase of lens thickness $\rightarrow$ shallow A.C

(2) Female

(3) Hypermetropes ?! Small eye. - shallow A.C

(4) Nervous $\rightarrow$ Congestion in ciliary body $\rightarrow$ pushing iris.

(5) Narrow Angle & shallow A.C

(6) Forward displacement of iris & lens diaphragm.

① Pupil dilatation due to

- Darkness
- Mydriatic
 - Sympathomimetic "Adrenalin"
 - Parasympatholytic "Atropin"

② ciliary body congestion.

- prone Position
- emotional excitement
- instruction

Mechanism of pupillary block in acute congestive Glaucoma?

- ① iris Bombe "most common Mechanism"
- ② iris crowding (plateau iris) "less common"
 - Root of dilated iris crowded in angle occluding it.

Clinical Picture (stages)

- (1) Prodromal (intermittent) stage
- (2) Acute congestive stage.
- (3) Chronic stage.
- (4) Absolute Glaucoma.
- (5) Atrophic stage.

① Prodromal stage.

Mechanism: Rapid partial closure of angle by iris followed by reopening by physiological Miosis

Transient attack of

"Symptoms"

- Headch.
- Haloes around light
- Blurred vision.

Signs

- I.o.P High but less than 40-50
- Cornea — o edema.
- No Redness.

Diagnosis

- (1) History
- (2) Gonioscopy — o Narrow angle.
- (3) Visual acuity show hypermetropes.
- (4) Provocative test

* Mydriatic test

- measure I.o.P
- given the patient weak mydriatic
- Remasured I.o.P

* Dark Room test.

- Measure I.o.P
- Patient stay in dark Room for 1 hour
- Remasured I.o.P.

↑ I.o.P by 8 mmHg or more is diagnostic.

⑬ Acute congestive Glucoma.

Mechanism: Sudden total closure of angle by peripheral iris.

- Symptoms:**
- ① Rapid Blurring due to stretch of outer coat.
 - ② Defect of vision due to • corneal edema.
 - ③ • optic nerve ischemia.
 - ③ Nauseas, Vomiting due to Reflex vagal stimulation.
 - ④ Redness.

Sign

- 1- Lid → Swollen
- 2- Conjunctiva → Ciliary congestion.
- 3- Cornea → Hazy
- 4- A.C → shallow
- 5- iris → iris bombe and congested.
- 6- Pupil → semi dilated.
 - Fixed irreactive. ?! dt. Paralysis of Pupillary muscle as ciliary nerve, artery are compressed.
 - Vertically oval ?! long fiber more affected.
 - Green blue.
- 7- I.O.P → stony Hard.
- 8- Fundus → disc hyperemic.
 - edematous.
 - Spontaneous Pulsating arterioles.
- 9- Visual acuity → dropped up to counting finger even PL.

Fate

If Treated:

- Resolution
- improve to chronic stage.

If untreated:

- The vision may be lost ^{dt.} (Absolute stage) or CRAO

Chronic stage.

Mechanism

- (1) as a consequence of Medical treatment of Acute attack
- (2) Repeated attack of Partial closure.

This Result in long contact between iris & lens
→ Prephral Anterior syneched.

Clinical Picture: (PPGGG)

[1] Posner's Triad: "GAP"

- Glaucoma Flecken "Ant. subcapsular cataract"
- Atrophic Patches of iris.
- Pigment dispersion inside eye.

[2] Constant elevation of I.O.P but less than 45 mmHg.
due to P.A.S.

[3] Gonioscopy show extensive fibrosis.

[4] optic nerve show Glaucomatous cupping.

[5] Permanent ciliary congestion.

[6] Gradual diminution of vision.

Absolute Glaucoma

def. It is the end stage of any uncorrected Glaucoma.

Symptoms:

- blind eye.
- Painful eye.

Sign:

- ① Cornea → degenerative Pannus.
- ② A.C → shallow
- ③ iris → Atrophic Patches
- ④ lens → complicated cataract
- ⑤ sclera → staphyloma.
- ⑥ I.o.p → High then low in atrophic stage.
- ⑦ optic nerve → Glaucomatous atrophy
- ⑧ Angle → P.A.S.
- ⑨ Fundus → cupping.

Atrophic stage.

Due to ciliary body atrophy → Hypotony.

Treatment :-

Prodromal stage.

→ Bilateral upper peripheral iridotomy by • laser
• or surgical iridectomy

N.B why bilateral?! because The other eye in latent stage.
50% develop acute attack within 5 year

why upper?! to be covered by eye lid to avoid deplopia
and cosmetically.

why peripheral?! to avoid lens injury

Acute stage.

Treatment of acute stage:

[1] Emergency case That Requires immediate Hospitalization

[2] Medical It is given for 24 hours to ↓ I.O.P to avoid Risk of

- optic nerve ischemia
- central Retinal artery occlusion
- Subluxation or dislocation of lens.

(a) hyper osmotic agent

- Mannitol 20 %
- Glycerol

Mechanism → with draws water → dehydration of vitreous

(b) Acetazolamide.

- Carbonic anhydrase inhibitor ~ Diamox.

Mechanism → decreases aqueous secretion.

(c) Beta blocker

- Timolol

Mechanism → ↓ Aqueous Secretion.

(d) Miotics.

- Pilocarpine until constriction of Pupil

Mechanism → Contraction of sphincter → Mechanical Pulling of iris from angle.

N.B given only after ↓ I.O.P as ischemia of iris. due to Pressure lead to No Response.

(e) Topical Anti inflammatory

- Steroid eye drop

Mechanism → ↓ inflammation & ↓ P.A.S Formation.

(f) Systemic analgesic Anti emetic.

[3] surgical treatment.

① if No or mild P.A.s
do peripheral iridectomy.

② if P.A.s
do sub scleral Trabeculectomy.

[4] Prophylactic treatment. For other eye.

upper peripheral laser iridotomy.

III. of chronic stage

sub scleral Trabeculectomy.

III. of Absolute stage

if blind Painful eye.

① cyclodestructive - destruction of C.B. by.

- laser Photo coagulation.
- cryo therapy.
- diathermy.

② Retro bulbar injection of 70% alcohol.

if atrophy bulbi or Staphyloma.

- Evisceration or Enucleation. and
artificial eye implant.

D.D

D.D of Haloes around light.

- ① Prodromal stage of PCAG
- ② corneal edema
- ③ Mucopurulent conjunctivitis.
- ④ incipient cataract.

Hy Potony.

def

I.o.p less than 10 mm Hg.

Causes

Disturbed outer coat.

- Ruptured globe
- Perforated corneal ulcer
- Post glaucoma surgery.

Dysfunction of ciliary body.

- Acute uveitis " ciliary shut down "
- Ciliary body detachment cyclitic Membrane

Ciliary body atrophy.

- Absolut glaucoma
- Cyclo destructive operation.
- Chronic uveitis.

Sever dehydration

Complication

~~Retinal detachment~~

↓ I.o.p → V.D → edema :-

- Macular edema.
- Choroidal detachment
- Retinal detachment.

" Primary open angle Glucoma "

" Chronic simple glaucoma "

- def:
- Chronic slowly Progressive optic neuropathy.
 - Primary glaucoma characterized by open angle & ↑ I.o.P leading to optic nerve damage, visual field defect

Incidence: It is The most common Primary Glucoma 2 %

Age: Above 50 year

sex: equal

laterality: bilateral asymmetrical

Race: black Race

History: Family history.

Etiology: ↓ aqueous out flow due to

- (1) sclerosis of T.M → narrowing space of Fontana.
- (2) sclerosis of juxta canalicular tissue.

R.F: (1) Age (More common above 50 years).

(2) black Race.

(3) Family history of glaucoma.

(4) ocular disease (High axial Myopia)

(5) ocular hypertension.

(6) Systemic disease. D.M & vaso spastic disorders migrn

→ A.P.C.d + H

Symptoms: [A] Asymptomatic in some cases.

[B] Symptom as

(1) Pathological Presbyopia → ↓ amplitude of accommodation.
(↑ I.o.P → Pressure on ciliary muscle and nerve → weakness)

(2) delayed dark adaptation described by night blindness
(due to atrophy the periphery of optic nerve)

(3) defect in Visual Field (difficult to cross street)

(4) C.R.V.O

(5) Headch.

Signs

- 1 Gonio scopy
- 2 I.O.P.
- 3 Field change.
- 4 Optic disc change (Glaucomatous cupping).

① Gonio scopy → open angle.

② I.O.P.

- If I.O.P above 22 mmHg with open angle → Suspicious
- if I.O.P above 26 mmHg with open angle → diagnostic
- If I.O.P is in the normal range not exclude Glaucoma

So we Resort to:-

- (a) difference between 2 eye More Than 4 mmHg.
- (b) Diurnal variation in same eye. More Than 4 mm Hg.
- (c) Provocative test. تجربة
- (d) Pachymetry to measure central Corneal Thickness
if thin may give rise to false I.O.P.

③ Optic disc changes = Glaucomatous cupping.

N.B

Normal optic Head :-

- Pink in colour & Slightly oval in shape.
- Has Physiological cup.
- Cup-disc Ratio = 0.3

optic disc change

Early

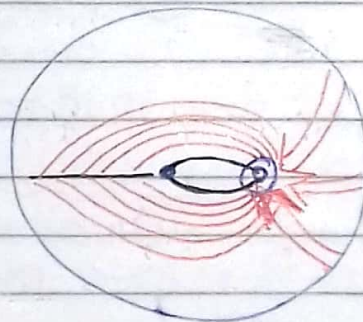
- 1] increase cup disc Ratio (0.4)
- 2] Asymmetry of C/D between 2 eyes
- 3] Vertical elongation of The cup.
" ISNT rule"
- 4] Notching of neuro Retinal Rim.
- 5] Splinter Hemorrhage on disc margin.
- 6] Stippling of lamina cribrosa due to increase visibility of Pores of lamina cribrosa.

late

- 1] large C/D Ratio More Than 0.7
- 2] increase depth of cup is seen as
 - Post bowing of lamina cribrosa
 - Undermined edge (overhanging)
 - Angulation of B.V
 - Nasal shift of B.V due to loss of nasal Rim.

④ Field change

NB



- Papillo macular Fiber
- Arcuate Fiber
- Nasal Fiber

- The most crowded fiber The most fiber affected early in Glaucoma. So Arcuate fiber early affected
- The least crowded The least fiber affected in Glaucoma So Papillo macular fiber affected only in late stage. (This explain sparing of fovea until late stage)
- No fiber from upper half enter through lower half

Arcuate → Nasal → Macular fiber

N.B Scotoma :- area with decreased Retinal sensitivity.

Type → Positive → seen by The Patient
→ Negative → Not seen by Patient

Types → Absolute → blind area (لا ترى النور مطلقاً)
→ Relative → decreased Sensitivity to different intensities of light or color (لا ترى النور مع اختلاف شدة الإضاءة)

N.B Blind spot → area corresponding to optic disc it has No Photo Receptor.

Field change.

central Field change (30°)

① Para Central scotoma
in Bjerrum area between 10 - 20 degree of fixation



② Seidel scotoma
due to extension of blind spot above or below in sickle shape.



③ Arcute scotoma (Bjerrum)
when it arches around point of fixation but not exceeding the horizontal Raphe.



④ Ring (Annular) scotoma
due to fusion of upper and lower arcute scotoma



بدراسة الدور على ال Nasal



Preperhal Field change.

① Nasal contraction ← يكش

② Ronne nasal step
Resulting from asymmetry between upper & lower field defect as they meet at horizontal meridian.

③ Concentric contraction of Preperhal field and fuse with central field until small island of center

④ Tubular field ± Temporal island



⑤ Total blindness when central and Temporal island disappear



Perimetry

- used to evaluate Visual Field.
- Normal limit of Visual Field.
- Method:

1] Kinetic Perimetry

2] static Method (automated Primetry).



6.5

Method to evaluate Glucoma

Tonometer
Tonography

Pachymetry
Perimetry

Ophthalmic
Goniometer

1] Tonometry

2] Tomography

① OCT [Optical coherence tomography]

- used to
- Study Thickness of nerve fiber layer around optic disc
 - Study macular lesion (edema).

② HRT [Heidelberg Retinal Tomography]

- used to
- study ~~nerve~~ nerve fiber Thickness

3] Pachymetry

- to measure central corneal Thickness.

4] Gonioscopy

- for angle examination.

5] Ophthalmoscopy

- For fundus examination

6] Primetry

- for detection Field loss. by

(SWAP) "short wave automated Primetry" or "blue on yellow Primetry"

Treatment of open angle Glaucoma

مقدمة

- 1 Medical Treatment
 - a local Treatment
 - b systemic Treatment.

2 Laser Trabeculoplasty.

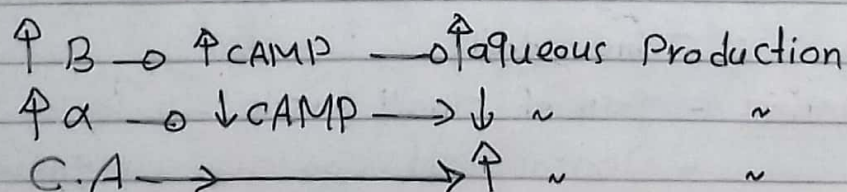
3 Surgical Treatment.

Medical Treatment

- ~~Miotics~~
- (1) Para sympathomimetic (Miotic)
- (2) Alpha agonist
- (3) Beta blocker
- (4) Prostaglandine analogue.
- (5) Topical carbonic Anhydrase inhibitor.
- (6) systemic ~

control secretion (+)

Ciliary Process



Control out Flow

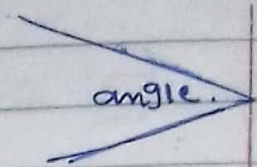
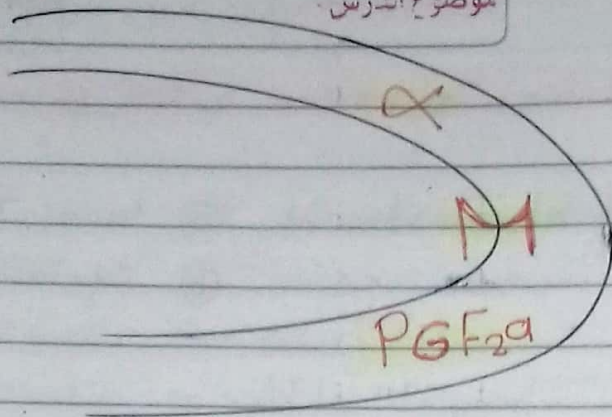
Subject

موضوع الدرس

Date

التاريخ

angle



- ↑ α → ↑ out flow
- ↑ M → ↑ out flow
- ↑ $PGF_{2\alpha}$ → ↑ out flow

Agent enhancing aqueous out flow (MAP)

- (1) Muscarinic agonist (Pilocarpine)
- (2) Adrenergic agonist (Epinephrine)
- (3) Prostaglandin (latanoprost).

Agent suppress aqueous secretion.

- (1) α_2 Agonist (Apraclonidine).
- (2) B.B (Timolol)
- (3) C.A.I (Acetazolamide).

Miotic

Types Pilocarpine nitrate.

Action • Stimulate Muscarinic Receptor → Contraction of ciliary muscle → Pull on scleral spur → widening Pores of T.M → ↑ out flow
• Contraction of sphincter pulling on angle.

dose 4 Time daily.

Side effect - spasm of ciliary muscle → Headch.
- Decrease night vision - Myopic shift
- Decrease field vision - 2nd glaucoma

(A)

Medical

Subject

موضوع الدرس

Date

التاريخ

	Alpha 2 agonist	Beta blocker	Prostaglandin analogue	Carbonic Anhydrase Inhibitor
Types	Brionidine. (Alphagan)	Non selective Timolol Selective beta Xolol	Latano Prost (Xalatan)	Dorzolamide BrinZolamide.
Action	(1) ↓ aqueous secretion (2) ↑ uveo scleral out flow	↓ aqueous Secretion.	↑ uveo scleral out flow	↓ aqueous secretion.
Dose	Twice daily.	Twice daily.	Once daily at Night.	Twice daily.
Sid effect	Allergy → ocular hypremia → Apnea in children. → Burning Sensation → Dry Mouth • Drowsiness • Fatigue • Headch.	(1) Punctate Keratitis (2) Corneal dryness (3) broncho spasm (4) brady cardia (5) impotence. (6) bronchial asthma (7) Heart block	(1) ↑ iris Pigmentation → Heterochromia (2) lengthening of eye lashes (3) cystoid Macular edema (4) secondary uveitis.	Allergy.
Precaution	Risk of APnea in children.			

B Laser Trabeculoplasty :-

Mechanism :- burn to Tubercular Meshwork aiming at Shrinking of Trabecular Ring and Contraction leading to widening of inter Tubercular Space. aiding in aqueous drainage.

Indication :- (1) Mild to Moderate cases
(2) above 60 year.

Types :- ALT (argon)
DLT (diode)
SLT (selective).

C Surgical Treatment.

Indication :- (1) Failed Medical and laser treatment
(2) Patient can't afford cost of Medication.
(3) Patient Non Compliance to Medical ^{تعليمات} ~~ttt~~
(4) Side effect of Medical ~~ttt~~.

Types 1 Sub scleral Trabeculectomy
2 Valve or Tube Surgery.

SST

aim → Producing fistula between A.C and subconjunctival space where the aqueous absorbed by subconjunctival BV

- Step →
- (1) Conjunctival Flap Made
 - (2) Scleral Flap is Raised.
 - (3) block of T.M is excised.
 - (4) Preperheral iridectomy.
 - (5) Closure of scleral and conjunctival Flap.

Glaucoma seton (valve implant).

→ Valve Placed sub conjunctivally connected to A.C by silicon Tube allowing drainage of aqueous.

Complication of open angle Glaucoma.

- (1) Glaucomatous optic atrophy
- (2) CRVO
- (3) Complicated cataract

D.D Tubular Field.

- (1) Primary open angle Glaucoma.
- (2) CRAO with Patent Cilio Retinal artery
- (3) Advanced Papilledema.
- (4) Advanced Retinitis Pigmentosa.

(Optic Nerve)

- sheet
- ✓* Papilledema
 - ✓* Papillitis
 - ✓* Toxic Myopia
 - ✓* Optic Nerve atrophy
 - ✓* Optic Neuritis

Edema of optic disc =

" of optic N. Head =

Papilledema

def.: bilateral, passive non inflammatory swelling of optic Nerve Head due to increase intra cranial Tention.

Etiology

- Intracranial
- Orbital
- ocular
- systemic

Intra cranial :

Due to increase intra cranial tention as in

- Neoplasm (brain Tumor)
- inflammation (brain abscess, Meningitis ...)
- Vascular (Cavernous sinus Thrombosis)
- Pseudo Tumor cerebri (↑ I.C.T with no mass) ?!

↓ Causes

- ✓ Idiopathic
- ✓ oral contraceptive Pills.
- ✓ Hyper Vitaminosis A, D
- ✓ Endocrine disorder.

orbital

Due to

- NePlasm
- inflammation (orbital cellulitis).

ocular

Due to

- CRVO
- Hypotony → V.D → Transudation.

systemic

Due to

- Vascular Retinopathy.
- Polycythemia, Anemia.
- Malignant Hypertension, Renal, Eclampsia

N.B Papilledema usually d2 ↑ I.C.T

Mechanism:

[1]

↑ intra cranial tension in sub arachnoid space around optic nerve → block axoplasmic flow → Swollen axon → Compress the vein → Congestion → Transudation.

[2]

↑ intra cranial tension → Direct compression on vein → Congestion → Transudation.

symptoms:-

- [1] symptoms of ↑ I.C.T • Headch.
• Projectile Vomiting.

[2] Ocular symptoms.

- ← • Early → Asymptomatic
 ← • Diplopia → d2 6th nerve Palsy. عصب شقيف مع أول زيادة في الضغط
 ← • Amaurosis fugax d2 sudden spasm of C.R.A. تشنج في الشريان
 ← • late → Gradual Progressive Painless diminution of vision d2 optic atrophy.

signs:-

- [1] Vision • early → Not affected
 • late → Gradual Progressive Painless diminution of vision.
- [2] Pupil • early → Not affected
 • late → irreactive d2 optic atrophy
- [3] Fundus • early → (1) Congested vein.
 (2) Flam shape Hmg.
 • late → (1) Dis
~~Hyperemia~~
 ill-defined edge
 elevated + 9 D.

 (2) Cup → obliterated.
 (3) Retina → Flam shaped Hmg.
 (4) Macula → Macular fan
 (5) Vein → Tortuous.
- [4] Field • Enlarged of blind spot
 • Central scotoma for blue
 • Contraction of Field up to tubular Filed.

Investigation:

- (1) Field of vision ^{show} x
- (1) Enlarged blind spot
 - (2) Central scotoma for blue.
 - (3) Contraction of Field up to Tubular Field
- (2) Colour vision → show central scotoma for blue.
- (3) CT & MRI to exclude brain Tumor
- (4) (VEP) visual Evoked Potential.
- early → Normal
- late → affected.

Complication:

secondary Post Papilledemic optic nerve atrophy.

C.C.C by -----

Treatment:

- (1) send to Neurologist to Treat The cause.
- (2) in idiopathic ↑ I.C.T
- ✓ stop Pills.
 - ✓ Reduce weight.
- (3) surgical
- seam → optic Nerve sheath decompression.
- Shunt surgery for sever Headch.
- ↳ c.s.f → peritonium.

D.D of dis Edema

- (1) Papilledema
- (2) Papillitis.
- (3) Pseudo Papilledema.
- (4) Other causes
 - ocular
 - orbital
 - systemic.

high axial hypermetropia

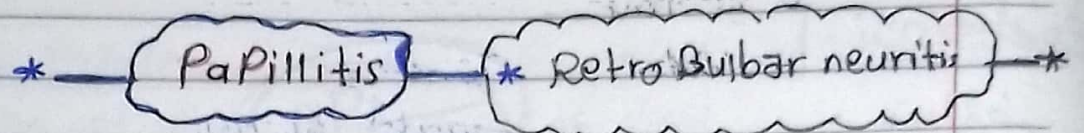
	Papilledema	Papillitis	Pseudo Papilledema
Mechanism	$\uparrow$ I.C.T $\rightarrow$ block axoplasmic flow	Exudate (active edema)	crowded disc.
laterality	bi lateral	uni lateral	uni or bi
Vision	Gradual Painless diminution of vision	Sudden Rapid diminution of vision	Hypermetropia
Pupil	early $\rightarrow$ Normal late $\rightarrow$ irreactive	unsustained Reaction. afferent pupillary defect	Normal.
Disc	• Elevated up to +9 D	• Elevated up to +3 D • Hyperemic disc.	
vessels	• Tortuous • leakage around the disc.	• tortuous • leaky vessels.	• Tortuous • Non leaky.
Vitrous	Clear	Vitrous flare.	clear
Field	• Enlarged blind spot • central scotoma for blue	• Central scotoma for Red, green	Normal

Optic Neuritis

def: Inflammation of optic nerve

Types

- (1) Papillitis :- inflammation of optic nerve disc.
- (2) Retrobulbar neuritis :- inflammation of nerve behind globe



Etiology:

- Non infective
 - ① Demyelinating diseases especially Disseminated sclerosis (commonest)
 - ② Toxic effect of drugs (T.B drugs)
 - ③ Metabolic disease as D.M
 - ↳ Vit. B₁₂ deficiency.

- Infective
 - ① Primary
 - ↳ Viral (Polio, Herpes)
 - ↳ Bact. (T.B, ~~S~~)
 - ② 2nd Extention of infection from
 - brain (Meningitis)
 - orbital (cellulitis)
 - ocular (uveitis)
 - sinuses (sinusitis)

Clinical Picture:-

Symptoms:-

- Rapid Marked drop of vision.
- Pain on Moving the eye only in Retrobulbar neuritis. ?!

Not Covered by  Optic nerve
Meninges or Myline sheath inside eye.

Sign:

- ① Vision —→ dropped.
- ② Pupil —→ un sustained Reaction (Afferent defect).
- ③ Fundus :-
 - Disc $\begin{cases} \rightarrow \text{Hyperemic} \\ \rightarrow \text{swelling + Elevated + 3D} \\ \rightarrow \text{ill defined margin} \end{cases}$
 - Cup $\rightarrow$ obliterated
 - Vetrus :- Vetrus flare.
 - vein :- Tortuous
 - leaky vessels.
- ④ Field :- Central scotoma for Red, Green.

D.D ✓

Progn (complication)

- ① Recovery within weeks or Months
- ② Recurrence is common in M.S.
- ③ Optic atrophy
 - $\rightarrow$ 2nd in Papillitis
 - $\rightarrow$ Primary in Retro Bulbar neuritis.

Itt1 Itt of caus2 systemic steroid3 Vit. B complex + Vasodilator

(Toxic amblyopia)

def: it is optic Nerve damage due to Exogenous toxins
or
Chronic inflammation of optic Nerve behind eye ball.
(Retro bulbar neuritis).

Classification

- 1] Tobacco & ethyle Alcohol
- 2] Quinine & salicylate.
- 3] Methylene Alcohol & Arsenic

Tobacco amblyopia :-

- **due to** degeneration of Ganglion cell by decomposition.
Product of Nicotine Through
 - chewing tobacco for many year
 - smoking cigar & pipes
 - Exposure to tobacco dust in factories.

• **CP**

Fundus → Normal

Field → centro-cecal scotoma.

ttt

- stop smoking
- V.D
- Vit. B complex

Quinin amblyopia.

- due to idiosyncrasy to drug. (Not dose Related & Genetic).
- C.P spasm of C.R.A

Fundus → cherry Red spots & Retinal artery Spasm.

Field → Tubular Vision → night blindness.

- III :-
- stop drug
 - Vaso dilator
 - Vit. B Complex.

Methyle Alcohol amblyopia.

- due to Methyle Alcohol intake or inhalation.

Pathogenesis:-

Methyle Alcohol → Formaldehyd + Formic acid.
 leading to → Acidosis → Anoxia → degeneration of Ganglion cell.

C.P Acute stage :- Nausea, Vomiting, Headch, Coma, death if survives :- Vision lost & optic atrophy.

- III
- * stop Methyle Alcohol
 - * V.D
 - * Vit. B Complex.
 - * in Acute stage → Gastric lavage + Ethyle Alcohol NaHCO₃ for acidosis.

Optic Nerve atrophy

def:- degeneration of optic nerve fibers due to interruption of nerve fiber at any point between Retinal ganglion cell and lateral geniculate body.

Clinical Picture :-

Types	Primary	secondary	Consecutive	Glaucomatous
Causes (Etiology)	① C.N.s. disease . • Disseminated sclerosis • Tabes dorsalis ② idiopathic ③ Optic nerve disease • Tumor → Pressing on optic n. • Trauma (fracture base) • ischemia as severe blood loss	① Post Papillitis ② Post Papilledema	(any Retinal disease) ① CRAO ② R.D ③ Retinitis Pigmentosa ④ Degenerative Myopia	Absolute Glaucoma
(Fundus)				
• Color	Milky white	Grey white	waxy yellow	white
• Edge	well defined	Irregular	irregular	well defined
• Cup	Enlarged	obliterated	obliterated	wide, deep
• Retina	Normal	sheathed	Attenuated	nasal shift
• Vessels				kinking, limbing
• lamina	seen	Not seen	Not seen	seen interrupted
(Pupil)	→ uni lateral cases → afferent pupillary defect → bilateral cases → Dilated Fixed Pupil			
(Vision)	No PL			
Field	No field			

N.B Foster Kennedy syndrome ?!

* Common seen with frontal lobe tumor

* Ipsilateral optic atrophy

+

Contra lateral Papilledema

what is Pseudo Foster Kennedy ?! إسألتي فيها شئوني
انتقاي اي واحد منها

N.B Tubular Field D.D

- (1) Advanced case of Glaucoma (POAG).
- (2) Advanced case of Retinitis Pigmentosa.
- (3) CRAO with abnormal cilio Retinal branch
- (4) Advanced Papilledema.

Secondary Glaucoma

def: increas I.o.p secondary to local eye disease.

Etiology:

	Open angle	Closed angle.
Corneal Causes	Corneal ulcer d2 Plasmoid aqueous.	• leucoma adherant & ant. staphyloma d2 PAS • Corneal Fistula after closure d2 P.A.s
A.C Causes	• Plasmoid aqueous • Hypopyon & HypHEMA	• Epithelial cyst • Ant. dislocation of lens.
Iris Causes	• Acute iritis d2 Plasmoid aqueous, hypopyon • Rubeosis iridis. • Pigmentary Glaucoma - • Herpes S, Z d2 Trabeculitis	• iris Tumor or cyst • Rubeosis iridis (late) d2 P.A.s • chronic iritis - & Seclisio or occasio Pupillae.
Lens Causes	* Phacolytic glaucoma * Phago anaphylactic Glaucoma. * Subluxation or Post. dislocation of lens d2 iritis * Pseudo exfoliation Glaucoma.	* Phacomorphic Glaucoma * Ant. dislocation of lens * subluxation of Post. dislocation of lens d2 Pupillary block by vitreous

Retinal Causes

- D.R → ischemia → Rubiosis iridis
- CRV.O → ~ → ~
- R.D → due to
- scleral buckle
 - steroid-tt
 - Intra-ocular injection of gases or Silicon-

Intra-ocular Tumor

- 12
- Pushing iris
 - occupying space
 - irido cyclitis
 - closure angle by Malignant cell

Drug

- ⊗ Steroid
- ⊗ Mydriatic

Tuma

- * Hyphema
- * iritis
- * siderosis bulbi

oral

- * Neo Vascular glaucoma
- * lens induced glaucoma

ocular Emergencies 212APCR

- ① Ant. dislocation of lens.
- ① Acute congestive glaucoma
- ② Panophthalmitis, orbital cellulitis, cavernous sinus—
- ③ ~~cataract~~
- ③ Progressive corneal ulcer (May perforate).
- ④ Chemical burn.
- ⑤ C.R.A.O
- ⑥ R.D
- ⑦ Ruptured globe.
- ⑧ Retained F.B

D.D

- Binocular diplopia.
- uninoocular diplopia.
- Blu sclera.
- larg cornea.
- lacrimation in neonate.
- Halos around light
- Tubular Vision.
- Red eye **
- cherry Red spot ***
- Night blindness.